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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/699,456

10/31/2003

David Champion

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EXAMINER

ONEILL, KARIE AMBER

ART UNIT

PAPER NUMBER

1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/06/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/699,456

Applicant(s)

CHAMPION ET AL.

Examiner

Karie O'Neill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 48, 49 and 65-71 is/are pending in the application.
- 4a) Of the above claim(s) 65-67 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20, 48, 49, 68-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 10, 2006, has been entered. Therefore, Claims 1-20, 48, 49 and 68-71 are pending in this office action. Claims 65-67 have been withdrawn from consideration.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-10, 15-17, 20, 48, 49, 68, 69, and 71 are rejected under 35 U.S.C. 102(b) as being anticipated by Li et al. (US 2002/0142202 A1).

With regard to Claims 1-3, and 49, Li et al. disclose in Figures 1 and 2, a fuel cell comprising: a substrate called a separator (16) which contains electrolyte materials

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(paragraph 0036-0038) or a current collector (paragraph 0049); and a patterned film (see Figure 2) composed of metal anode material (12) comprising electrode fibers (30), also called nanofibers or nanowires dispersed within the metal anode material; wherein the plurality of electrode nanofibers enhances catalytic activity and conductivity of the patterned film and increases the number of sites per volume where catalysis takes place. Li et al. disclose the cathode electrode containing catalyst material that would increase current density and the catalytic activity of the patterned film (paragraph 0039), therefore, it is inherent that the catalytic materials in the anode material would also increase current density and catalytic activity.

With regard to Claim 4, Li et al. disclose where the electrolyte is at least one of a hydroxide conducting material (paragraph 0036).

With regard to Claim 5, Li et al. disclose wherein the substrate is at least one of current collector materials (paragraph 0038).

With regard to Claim 6, Li et al. disclose the plurality of electrode nanofibers is formed from at least one of ferrous metals (paragraph 0047).

With regard to Claims 7-8, Li et al. disclose wherein the current collector material comprises high temperature metals of at least one of copper, stainless steel and nickel alloys (paragraph 0043).

With regard to Claim 9, Li et al. disclose wherein the patterned film comprises an anode (Figure 2 and paragraph 0047).

With regard to Claim 10, Li et al. disclose wherein the plurality of electrode nanofibers comprises metallic components of anode material (paragraph 0050).

With regard to Claim 15, Li et al. disclose in Figures 2 and 5, wherein the plurality of electrode nanofibers is randomly oriented throughout the patterned film (paragraph 0057).

With regard to Claims 16-17, Li et al. disclose wherein the plurality of electrode nanofibers has a diameter ranging from 1 nanometer to 1 millimeter (paragraph 0050).

With regard to Claim 20, Li et al. disclose an electrical load and the fuel cell disclosed above connected to the load (paragraph 0012).

With regard to Claim 48, Li et al. disclose in Figures 1 and 2, a fuel cell comprising: a substrate called a separator (16) which contains electrolyte materials (paragraph 0036-0038) or a current collector (paragraph 0049); and a patterned film (see Figure 2) composed of metal anode material (12) comprising electrode fibers (30), also called nanofibers or nanowires dispersed within the metal anode material; wherein the plurality of electrode nanofibers enhances catalytic activity and conductivity of the patterned film and increases the number of sites per volume where catalysis takes place. Li et al. disclose the cathode electrode containing catalyst material that would increase current density and the catalytic activity of the patterned film (paragraph 0039), therefore, it is inherent that the anode material would also use catalytic materials to increase current density and catalytic activity. Li et al. also disclose connecting the fuel cell to an electrical load (paragraph 0012).

With regard to Claims 68 and 71, Li et al. disclose the fuel cell being any one of conventional fuel cells including a solid oxide fuel cell or a single chamber fuel cell (paragraph 0011).

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With regard to Claim 69, Li et al. disclose wherein the plurality of electrode nanofibers is connected to at least one of electrolyte grains which are part of the electrolyte material that makes up the substrate on which the patterned film is established (paragraphs 0035-0036).

4. Claims 1-6, 9-10, 12-13, 49 and 69-71 are rejected under 35 U.S.C. 102(e) as being anticipated by Mardilovich et al. (US 6,770,353 B1).

With regard to Claims 1-3, 49, and 71, Mardilovich et al. disclose a thin film solid oxide fuel cell (Figure 11), comprising: a substrate of electrolyte material; and a patterned film established on the substrate (Figure 5A), the patterned film having a plurality of nanocolumns (16) dispersed in filler (20) which form the patterned film (18); wherein the plurality of nanocolumns enhances catalytic activity and conductivity of the patterned film, and wherein the plurality of nanocolumns increases the number of sites per unit volumes where catalysis takes place (column 7 lines 29-47).

With regard to Claim 4, Mardilovich et al. disclose wherein the electrolyte is at least one of yttria-stabilized zirconia (column 7 line 33).

With regard to Claim 5, Mardilovich et al. disclose wherein the substrate is at least one of a ceramic, which is formed of the electrolyte material of yttria-stabilized zirconia (column 7 line 33).

With regard to Claim 6, Mardilovich et al. disclose wherein the plurality of nanocolumns is formed from at least one of electrolyte filament materials, which is yttria-stabilized zirconia (YSZ) (column 3 line 37).

With regard to Claims 9-10 and 12-13, Mardilovich et al. disclose in Figure 11, wherein the patterned film comprises anode (58) and cathode (60) films (column 7 lines 29-33), which are formed of materials including metallic components of anode and cathode material (column 3 lines 34-37).

With regard to Claim 69, Mardilovich et al. disclose in Figure 11, the plurality of nanocolumns are connected to at least one of electrolyte grains which are part of the electrolyte material which makes up the substrate upon which the anode and cathode patterned films are deposited (column 7 lines 29-33).

With regard to Claim 70, Mardilovich et al. disclose in Figure 11, wherein the plurality of nanocolumns are formed from electrolyte filament material or YSZ (column 3 line 37), and wherein the fuel cell further comprises cathode material nanocolumns, made of YSZ, dispersed and connected to the electrolyte filament material nanocolumns, which are both made of the same material and would inherently be dispersed with one another.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 2002/0142202 A1), as applied to Claims 1-10, 15-17, 20, 48, 49, 68,

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69, and 71 above and over Mardilovich et al. (US 6,770,353 B1), as applied to Claims 1-6, 9-10, 12-13, 49 and 69-71 above, and in further view of Jeon et al. (US 2004/0197626).

Li et al. disclose the fuel cell in paragraph 3 above and Mardilovich et al. disclose the fuel cell in paragraph 4 above, but neither reference disclose wherein the anode metallic components comprise at least one of nickel-copper alloys, platinum, palladium, ruthenium, alloys thereof and mixtures thereof, and wherein the cathode metallic components comprise at least one of rhodium, platinum, silver, alloys thereof and mixtures thereof.

Jeon et al. disclose a solid oxide fuel cell in which the anode and cathode materials are made of a thin film of a suitable catalyst material such as nickel, platinum or platinum alloy nanoparticles (paragraph 0019). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use metallic anode and cathode components in the fuel cell of Li et al. and/or Mardilovich et al. because the these components are good conductive materials (paragraph 0019).

7. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardilovich et al. (US 6,770,353 B1), as applied to Claims 1-6, 9-10, 12-13, 49 and 69-71 above.

Mardilovich et al. disclose the fuel cell in paragraph 4 above, but do not disclose the diameter and/or the length of the nanowires. However, Mardilovich et al. recognize that the relative deposition rates will influence the technique for changing the angle of

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the nanocolumns (column 4 lines 20-31). Therefore, it would have been within the skill of the ordinary artisan to increase or decrease the diameter of the nanocolumns to a range between about 1nm and about 100nm, more preferably between about 10nm and about 50nm, and the length of the nanocolumns to a range between about 15nm to about 2000nm, more preferably between about 100nm and about 500nm in order to control the formation of the continuous film with nanocolumns (column 4 lines 34-36).

Discovery of an optimum value of a result effective variable in known processes is ordinarily within the skill of the art. In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ. 215.

8. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 2002/0142202 A1), as applied to Claims 1-10, 15-17, 20, 48, 49, 68, 69, and 71 above.

Li et al. disclose the fuel cell in paragraph 3 above, including the length of the plurality of electrode nanofibers having a length ranging from about 0.5 millimeters to 1000 meters. However, Li et al. recognizes that the length of the electrode nanofiber may also vary greatly depending on various factors (paragraph 0051). Therefore, it would have been within the skill of the ordinary artisan to decrease the length of the electrode nanofibers to a range between about 15nm to about 2000nm, more preferably between about 100nm and about 500nm in order to affect the dimensions of the electrode. *Discovery of an optimum value of a result effective variable in known processes is ordinarily within the skill of the art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ 215.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAO



DAI-WEI YUAN
PRIMARY EXAMINER

Karie O'Neill
Examiner
Art Unit 1745